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FOREST PEST MANAGEMENT
Pacific Southwest Region

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3420 Biological Evaluation
November 13, 1986

INCIDENCE OF FOMES ANNOSUS STUMP INFECTION ON THE DOUBLEHEAD AND DEVILS GARDEN RANGER DISTRICTS, MODOC NATIONAL FOREST

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ABSTRACT

Ten, 8-to 15-year-old, non-boraxed sale areas in the eastside pine type on the Modoc National Forest were examined for Fomes annosus infection. Stump infection averaged 50%. The number of active annosus centers per acre averaged 1.9. Some centers were over an acre in size. An average of 20% of the area examined was out of production because of annosus infection of stumps. Larger diameter stumps were more likely to have F. annosus conks than smaller diameter stumps. Boraxing of pine stumps 8 inches or larger in diameter in the eastside pine type on the Modoc National Forest is highly recommended.

INTRODUCTION

Following a biological evaluation (reference 3430 Evaluation, Report No. 85-18, August 22, 1985) on pests associated with the shear and stack technique for precommercial thinning on the Doublehead Ranger District, the Modoc National Forest requested further information on annosus root disease, caused by Fomes annosus. Specifically, information on the current levels of annosus root disease in the eastside pine type on the Forest was requested in order to determine the need to borax stumps as a protective measure against stump infection. Since the Forest's request, Modoc National Forest Zone Silviculturist Dave Evans also requested historical information on why boraxing of chain saw-thinned pine stumps 8 inches or larger in diameter is routinely done on the Devils Garden Ranger District.

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Surveys conducted by the adjacent Lassen National Forest in the eastside pine type indicate that the number of stumps infected can range from 0 to over 50%, but usually runs from 5 to 15%. Based on these percentages, the Lassen routinely boraxes stumps 8 inches or larger in diameter. Except for the Fletcher Sale (unnumbered Biological Evaluation, 1975) on the Devils Garden Ranger District, where 65% of the non-boraxed stumps resulted in annosus root disease centers, the same historical information is not well-documented for the eastside pine type on the Modoc National Forest.

The objectives of this evaluation were to determine the levels of F. annosus currently present in the eastside pine type on the Devils Garden and Doublehead Ranger Districts on the Modoc National Forest, including frequency and size of annosus centers resulting from infection of non-boraxed stumps created by chain saw.

PROCEDURE

Ten, 8-to 15-year-old, sale areas were examined during the week of May 19-23, 1986. Six were on the Devils Garden Ranger District and four on the Doublehead Ranger District. See Appendix for locations. All sale areas were in the eastside pine type, consisting of ponderosa pine and varying amounts of western juniper, sagebrush, grasses, and ocassional mountain mahogeny. Stumps had not been boraxed in the sales examined.

In each area, a one chain-wide strip survey was ran for 20 to 40 chains parallel to a road. All stumps within the strips were measured for diameter and examined for the presence of F. annosus. If F. annosus conks were found in or on a stump, the stump was recorded as infected; if no conks were present, it was tallied as not infected. Dead and dying trees around the stumps were noted and estimates of area of each root disease center were made. The area sampled varied in each sale area (Table 1).

RESULTS AND DISCUSSION

Results from the ten sale areas examined are presented in Table 1. Stump infection averaged 50%, ranging from 20% in the Timbered Ridge Sale to 80% in the Craig Spring Sale. Levels of stump infection were relatively low on the Crowder, Timbered Ridge and Cupboard Sales, but were still 20% or more.

Table 1. Incidence of Fomes annosus pine stump infection on ten sale areas on the Modoc National Forest.

Sale	Year Cut	Area Sampled	No. Active[1] Centers		Pine Stumps Infested		Dead[2] Pines
		acres	total	per acre	No.	%	No.
Devils Garden R.D.							
Everly	1971	3.5	8	2.3	14/35	40	22
Poindexter	1976	2.0	4	2.0	19/40	48	5
Crowder	1977	2.0	3	1.5	9/40	23	6
Widow Valley	1974	4.0	8	2.0	28/51	55	31
Knobcone	1973	4.0	13	3.3	38/54	70	50
Craig Spring	1970	4.0	12	3.0	39/49	80	21
Doublehead R.D.							
Warm Springs	early 70's	4.0	7	1.8	22/40	55	14
Bird Springs	mid 70's	4.0	11	2.8	26/36	72	54
Timbered Ridge	mid 70's	4.0	1[3]	0.3	7/35	20	2
Cupboard	late 70's	3.5	0[3]	0.0	11/42	26	0
	TOTALS	35	67		213/422	50	205

[1]Based on the presence of a dying or recently dead pine(s) adjacent to the stump. An area with more than one stump associated with the dying or recently dead trees was counted as one active annosus root disease center.
[2]Total number of dying or recently dead pines adjacent to infested stumps.
[3]Area was recently thinned with mechanical shearer. Thinning would have removed dead or dying trees in vicinity of stumps from previous sales.

Size of annosus centers varied. In many cases, only one or two dead or dying pines were associated with infested stumps. In the Knobecone, Craig Spring, and Bird Springs sale areas however, dead and dying pines over an acre or more in area were associated with stumps infested with F. annosus. Recently dead or dying sapling, pole, or sawtimber-sized ponderosa pines on these three sales averaged about 12 per acre. Juniper and sagebrush also were infected with F. annosus in these root disease centers.

The number of active annosus centers observed per acre varied from none on the Cupboard Sale to 3.3 per acre on the Knobcone Sale, and averaged 1.9 centers per acre for all sales. If, as a conservative estimate, each active center averaged 0.1 acre, then about 20% of each acre surveyed was out of production due to annosus root disease. In terms of the survey, 7 of the 35 acres examined were infested with annosus root disease.

Stump infection varied with stump diameter (Table 2). Although the data should be interpreted with caution because of the low numbers of stumps encountered that were 12 inches or less in diameter, larger diameter stumps were more likely to have F. annosus conks than smaller diameter stumps.

Table 2. Stumps with Fomes annosus conks, by diameter class, on ten sale areas on the Modoc National Forest.

Stump Diameter inches	Total	With Conks	Infested %
12 or less	20	0	0
13 to 24	33	9	27
24 or more	369	204	55
TOTALS	422	213	50

CONCLUSIONS

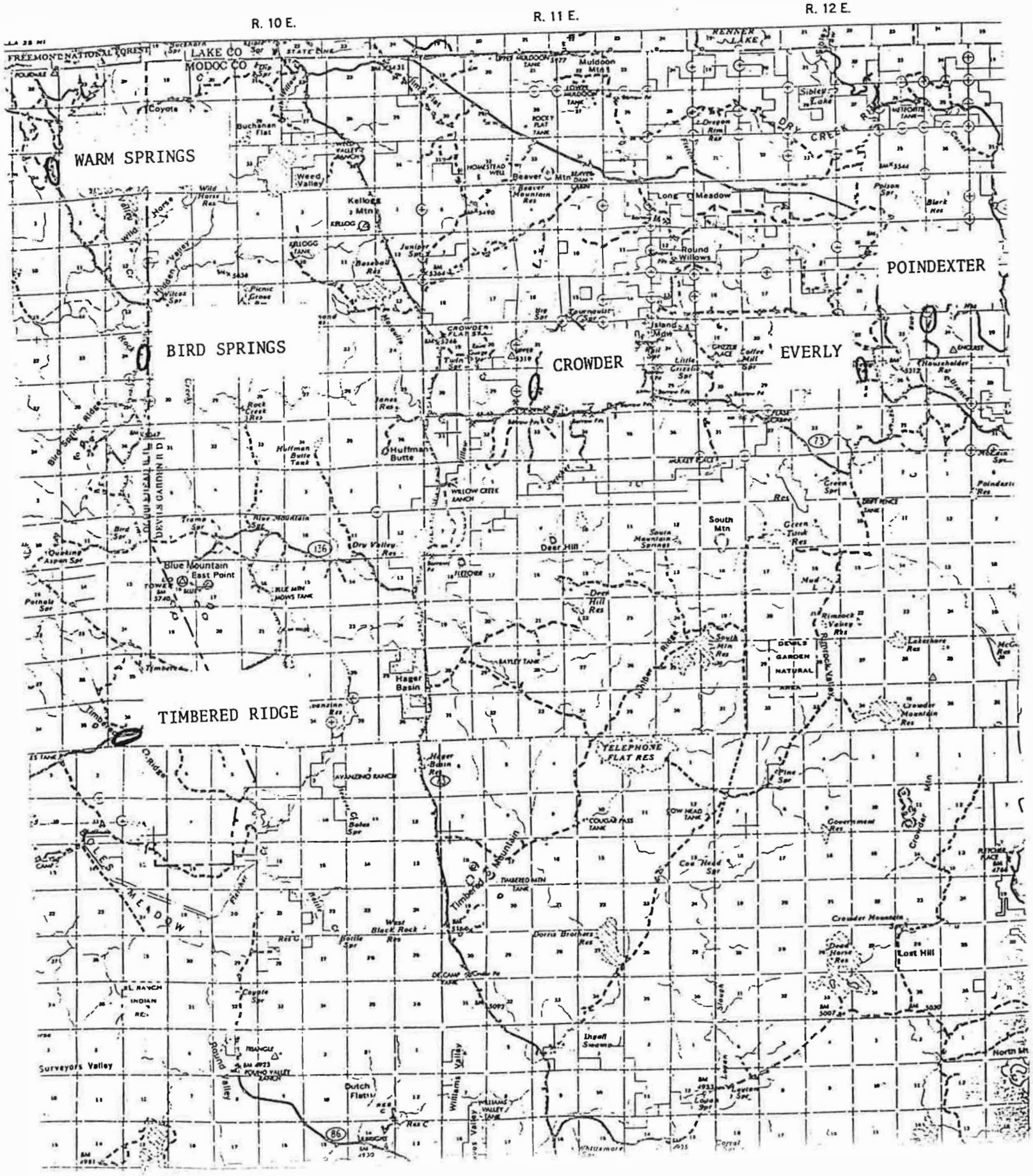
The rates of stump infection found on the Modoc National Forest are unusually high compared to the adjacent Lassen National Forest, where rates average 5 to 15%. The numbers of infested stumps in the sale areas examined on the Modoc National Forest are probably higher than recorded because only stumps with conks were counted as infested. These high rates of infection are resulting in at least 20% of each acre being currently out of production, as evidenced by the number of dead pines encountered. Since F. annosus can survive in infested stumps for up to 50 years, a conservative estimate is that about 1/5 of the area in non-boraxed timber sales on the Modoc National Forest will not produce merchantable pines for the next 20 to 40 years.

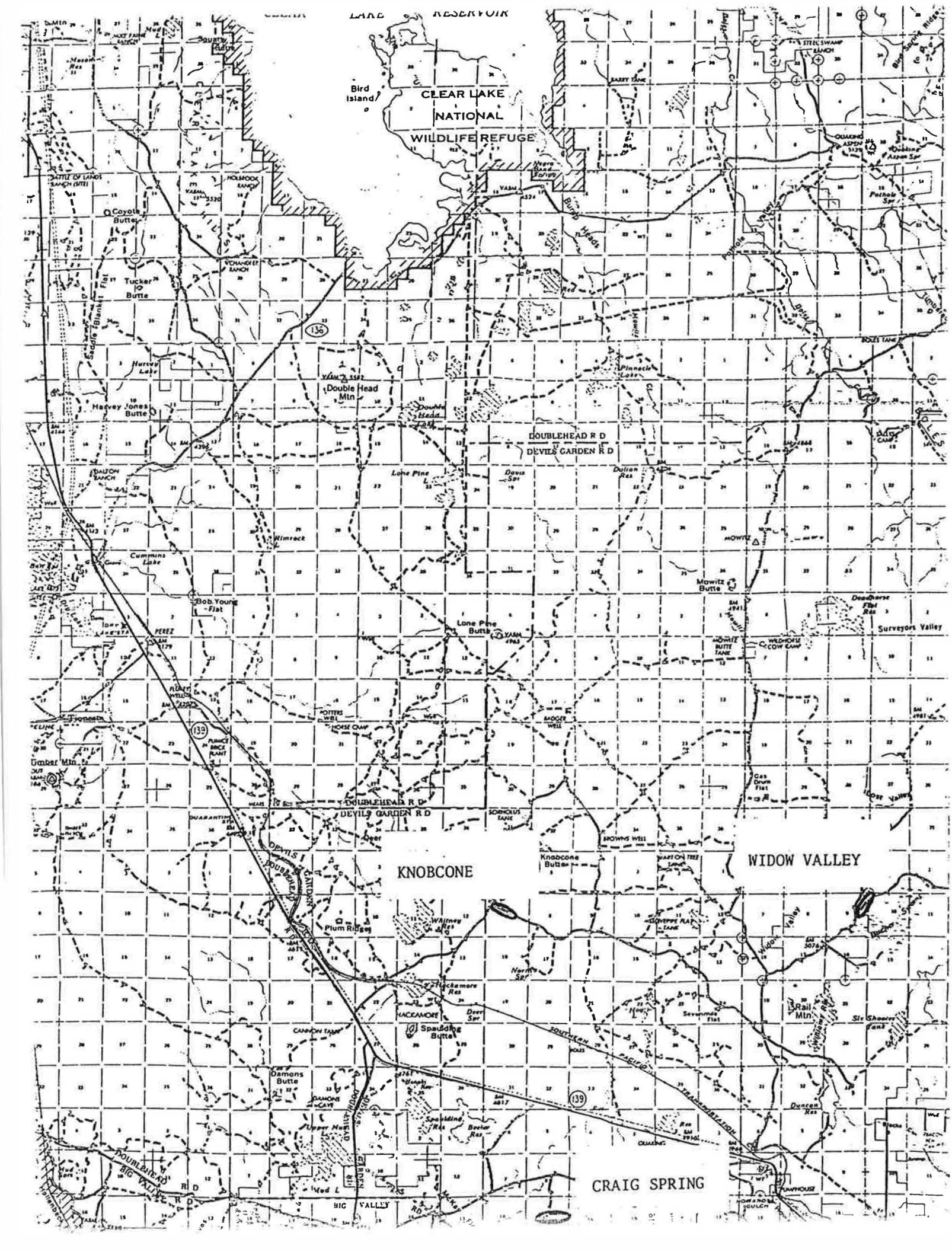
Infection rates were relatively low on the Timbered Ridge and Cupboard Sales on the Doublehead Ranger District. Reasons were not examined in detail, but the most obvious site differences observed were drier soil conditons and the presence of pumice soil in the Cupboard area. Decayed stumps in these two sale areas were very dry, in contrast to moist stumps encountered on the other sales.

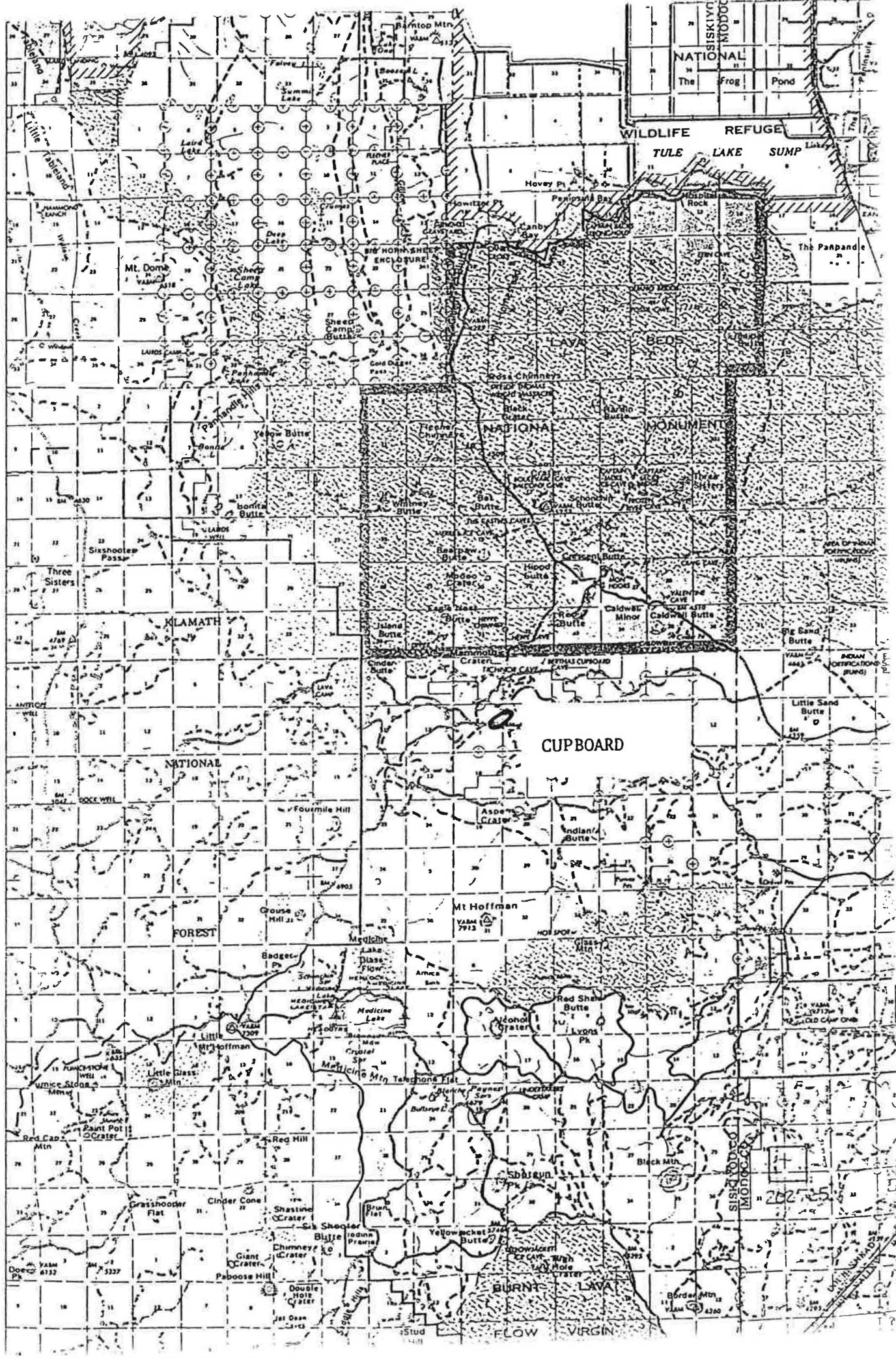
Treatment of freshly cut conifer stumps with borax is about 95% effective in preventing infection by F. annosus. The use of borax on stumps 8 inches or larger in diameter in the eastside pine type on the Modoc National Forest is highly recommended.

APPENDIX

Locations of non-boraxed timber sales surveyed, Modoc National Forest.




CLEAR LAKE
NATIONAL
WILDLIFE REFUGE
Bird Island
Coyote Butte
Tucker Butte
Saddle Blanket Flat
Harvey Jones Butte
Double Head Mtn
DOUBLEHEAD R D
DEVILS GARDEN R D
Lone Pine
Dalton Ranch
Cummins Lake
Bob Young Flat
Perez
Lone Pine Butte
Mowitz
Mowitz Butte
Deadhorse Flat Res
Surveyors Valley
Timber Mtn
Potters Well
Horse Camp
Moger Well
Gas Drum Flat
Browns Well
Knobcone Butte
KNOBCONE
WIDOW VALLEY
Plum Ridge
Whitney Res
Hackamore Res
Hackamore
Spaulding Butte
Damons Butte
Damons Camp
Spaulding Res
Beaver Res
Rail Mtn
Duncan Res
Blocks
Sawhouse
CRAIG SPRING
BIG VALLEY
DOUBLEHEAD R D
BIG VALLEY R D
Mud L
Willow Creek
Squaw Flat
Holbrook Ranch
Battle of Lanos Ranch (site)
Harvey Lake
Pinnacle Lake
Roles Tank
Roles
Dalton Res
Wimrack
Potholes
Burnt Hyeds
Steele Swamp Ranch
Quaking Aspen Spr
Dubbins Aspen Spr
Pothole Spr
Tumbler
Dolan
Double Head Lake
Davis Spr
Potters Well
Horse Camp
Moger Well
Sorrows Tank
Gas Drum Flat
Lost Valley
Knobcone Butte
Walton Tree Lake
Widow Valley
Seventeen Flat
Sit Shooter Tank
Southern Pacific Transportation
Upper Hiehl Rd
Cannon Tank
Howard Gulch
136
139


T. 46 N.
T. 45 N.
T. 44 N.
T. 43 N.
NATIONAL
WILDLIFE
REFUGE
TULE
LAKE
SUMP
The Frog Pond
Barnton Mtn
Howard Bay
Canby Bay
Rocky Point
Peninsula
Hospital Rock
The Panpandle
Mt. Dome
Sheep Camp Butte
Sheep Camp Lake
Deep Lake
Laird Lake
Little Tableland
Hammond Ranch
Big Horn Sheep Enclosure
Lava Beds
National Monument
Yellow Butte
Bonita Butte
Whitney Butte
Bat Butte
Schonchin Butte
Three Sisters
Sixshooter Pass
Modoc Point
Hippo Butte
Caldwell Minor
Caldwell Butte
Big Sand Butte
Little Sand Butte
Cinder Butte
Mammoth Crater
Lava Camp
Antrim Well
Klamath
CUPBOARD
Fourmile Hill
Aspen Crater
Indian Butte
Mt Hoffman
Grouse Hill
Forest
Medicine Lake
Badger Pk
Amica
Red Shale Butte
Lyons Pk
Little Mt Hoffman
Little Glass Mtn
Telephone Flat
Pumice Stone Mtn
Red Cap Mtn
Paint Pot Crater
Red Hill
Black Mtn
Sharpe Pk
Grasshopper Flat
Cinder Cone
Shastina Crater
Sheepshooter Butte
Indian Prairie
Yellowjacket Butte
Chimney Crater
Giant Crater
Paiute Hill
Doe Pk
Double Hole Crater
Burnt Lava Flow
Border Mtn
Stud
Virgin
Modoc
Siskiyou